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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/718,668	11/24/2003	John Ingalis Thackara	033785-013	1626
21839	7590	08/22/2005		
BUCHANAN INGERSOLL PC (INCLUDING BURNS, DOANE, SWECKER & MATHIS) POST OFFICE BOX 1404 ALEXANDRIA, VA 22313-1404				EXAMINER CONNELLY CUSHWA, MICHELLE R
				ART UNIT 2874 PAPER NUMBER

DATE MAILED: 08/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.	10/718,668	
Examiner	THACKARA, JOHN INGALLS	
Michelle R. Connelly-Cushwa	Art Unit 2874	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM  
THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

1) Responsive to communication(s) filed on \_\_\_\_\_.  
2a) This action is FINAL.                            2b) This action is non-final.  
3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

4) Claim(s) 1-33 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.  
5) Claim(s) \_\_\_\_ is/are allowed.  
6) Claim(s) 1-4,8,13-18,22 and 25-33 is/are rejected.  
7) Claim(s) 5-7,9-12,19-21,23 and 24 is/are objected to.  
8) Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

9) The specification is objected to by the Examiner.  
10) The drawing(s) filed on 24 November 2003 is/are: a) accepted or b) objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) All    b) Some \* c) None of:  
1. Certified copies of the priority documents have been received.  
2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

1) Notice of References Cited (PTO-892)  
2) Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 0204.

4) Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.  
5) Notice of Informal Patent Application (PTO-152)  
6) Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Information Disclosure Statement***

The prior art documents submitted by applicant in the Information Disclosure Statement filed on February 10, 2004 have all been considered and made of record (note the attached copy of form PTO-1449).

### ***Drawings***

Eight (8) sheets of formal drawings were filed on November 24, 2003 and have been accepted by the Examiner.

### ***Specification***

Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

### ***Claim Objections***

#### **Claims 14, 26 and 31 are objected to because of the following informalities:**

Regarding claim 14; the claim does not conclude with a period, additionally the claim states that the alignment coating comprises  $\text{SiO}_x$ , but does not define x.

Regarding claims 26 and 31; the claims state that the alignment coating comprises  $\text{SiO}_x$ , but do not define x.

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**Claims 1-4, 8, 13-18, 22 and 25-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Song (US 2002/0076142 A1).**

Regarding claims 1, 15, 27 and 33; Song discloses an integrated optical switch/variable optical attenuator (see Figures 2D and 3), comprising:

- an optical Y-branch waveguide structure (Figure 3) capable of guiding at least one optical mode and including:
  - o a cladding medium;
  - o a channel waveguide core (340) disposed in the cladding medium and containing an input branch (320) and first and second output branches (360, 380), the channel waveguide core capable of guiding at least one optical mode;
  - o a first liquid crystal material (312; see paragraph [0042], in which Song explains that a thermal-optical liquid crystal material may be used in the invention), the first liquid crystal material associated with the first output branch; and
  - o a first temperature control element (heating element, see paragraph [0042]) disposed in heat exchange relationship with the first liquid crystal material, the first temperature control element selectively adding heat to the first liquid crystal material to thereby change the phase thereof, said change producing differential refractive index loading of the optical Y-branch

waveguide such that at least a portion of optical mode light directed into one of the first and second output branches is redirected into the other of the first and second output branches;

- o wherein the waveguide core comprises a solid medium that is capable of transmitting optical radiation propagating along a given direction.

Therefore, Song teaches a method for selectively directing light in an input branch of an optical structure into one or more of multiple output branches, the method comprising launching light into the optical structure and using the temperature control element to change the phase of the liquid crystal material, thereby causing at least a portion of the light launched into the optical structure to be redirected from one output branch into another.

Song does not explicitly state that the phase is changed from nematic to isotropic. However, one of ordinary skill in the art would have found it obvious to incorporate a liquid crystal material in which the phase is changed from nematic to isotropic in the invention of Song, since such liquid crystal materials are known thermo-optical liquid crystal materials in the art and Song suggests using a thermo-optical liquid crystal material.

Regarding claims 2, 3, 16, 17, 28 and 29; Song discloses all of the limitations of these claims as applied above, except for specifically stating that the liquid crystal material is positively or negatively birefringent. Song does not suggest that a liquid crystal material having any particular birefringence must be incorporated in the

invention, thereby suggesting a lack in criticality of this particular feature. One of ordinary skill in the art would have found it obvious to incorporate either a positively birefringent liquid crystal material or a negatively birefringent liquid crystal material in the invention of Song, as the thermo-optical liquid crystal material, since Song does not suggest that a particular liquid crystal material is used, since both positively and negatively birefringent liquid crystal materials are known and readily available in the art, and since it appears that the invention would perform equally well regardless.

Regarding claims 4 and 18; Song discloses that a second liquid crystal material is associated with the second output branch.

Regarding claims 8 and 22; the switch further includes a second temperature control element disposed in heat exchange relationship with the second liquid crystal material and operating to selectively add heat to the second liquid crystal material to thereby change the phase thereof. Song does not explicitly state that the second liquid crystal material has ordinary and isotropic refractive indices that correspond to nematic and isotropic phases of the liquid crystal material, respectively, and that the phase is changed from nematic to isotropic. However, one of ordinary skill in the art would have found it obvious to incorporate a second liquid crystal material in which the phase is changed from nematic to isotropic in the invention of Song, since such liquid crystal materials are known thermo-optical liquid crystal materials in the art and Song suggests using a thermo-optical liquid crystal material.

Regarding claims 13, 25 and 30; the liquid crystal material is disposed in trenches having a first side, a second side, a top and a bottom, at least one of the first

side, the second side, the top and the bottom including an alignment coating (see paragraphs [0041] and [0043]).

Regarding claims 14, 26, 31 and 32; Song does not explicitly state that the alignment coating comprises  $\text{SiO}_x$ . One of ordinary skill in the art would have found it obvious to incorporate any alignment coating in the invention of Song, including  $\text{SiO}_x$ , since Song does not teach that a specific alignment coating must be used, thereby suggesting a lack of criticality in this particular feature, and since it appears that the invention would perform equally well regardless of the particular alignment coating employed.

Furthermore, applicant is claiming the product including the process of forming the alignment coating, and therefor claims 14, 26 and 32 are of "product-by-process" nature. The courts have been holding for quite some time that: the determination of the patentability of product-by-process claim is based on the product itself rather than on the process by which the product is made. *In re Thrope*, 777 F. 2d 695, 227 USPQ 964 (Fed. Cir. 1985); and patentability of claim to a product does not rest merely on a difference in the method by which that product is made. Rather, it is the product itself which must be new and unobvious. Applicant has chosen to claim the invention in the product form. Thus a prior art product which possesses the claimed product characteristics can anticipate or render obvious the claim subject matter regardless of the manner in which it is fabricated. A rejection based on 35 U.S.C. section 102 or alternatively on 35 U.S.C. section 103 of the status is eminently fair and acceptable. In

re Brown and Saffer, 173 USPQ 685 and 688; In re Pilkington, 162 USPQ 147. As such no weight is given to the process steps recited in claims 14, 26 and 32.

***Allowable Subject Matter***

Claims 5-7, 9-12, 19-21, 23 and 24 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: The prior art cited on attached form PTO-892 is the most relevant prior art known, however, the invention of claims 5-7, 9-12, 19-21, 23 and 24 distinguishes over the prior art of record for the following reasons.

Regarding claims 5, 6, 19 and 20; the claims are allowable over the prior art of record because none of the references either alone or in combination disclose or render obvious an integrated optical switch as defined in claim 5 or a variable optical attenuator as defined in claim 19, wherein the second liquid crystal material posses a fixed refractive index lying between the ordinary and isotropic refractive indices of the first liquid crystal material in combination with the other limitations of the base and intervening claims. Claim 6 depends from claim 5. Claim 20 depends from claim 19.

Regarding claims 7 and 21; the claim is allowable over the prior art of record because none of the references either alone or in combination disclose or render obvious an integrated optical switch as defined in claim 7 or a variable optical attenuator as defined in claim 21, wherein the cladding has a refractive index lying between the

ordinary and isotropic refractive indices of the first liquid crystal material in combination with the other limitations of the base and intervening claims.

Regarding claims 9 and 23; the claim is allowable over the prior art of record because none of the references either alone or in combination disclose or render obvious an integrated optical switch as defined in claim 9 or a variable optical attenuator as defined in claim 23, wherein the refractive index of the channel waveguide core is higher than the ordinary refractive index of the first liquid crystal material and higher than the isotropic refractive index of the first liquid crystal material in combination with the other limitations of the base and intervening claims.

Regarding claims 10-12 and 24; the claims are allowable over the prior art of record because none of the references either alone or in combination disclose or render obvious an integrated optical switch as defined in claim 10 or a variable optical attenuator as defined in claim 24, wherein one of or both the isotropic and ordinary refractive indices of the first liquid crystal material are higher than the refractive index of the channel waveguide core in combination with the other limitations of the base and intervening claims. Claims 11 and 12 depend from claim 10.

Hence, there is no reason or motivation for one of ordinary skill in the art to use the prior art of record to make the invention of claims 5-7, 9-12, 19-21, 23 and 24.

### ***Conclusion***

Any inquiry concerning the merits of this communication should be directed to Examiner Michelle R. Connelly-Cushwa at telephone number (571) 272-2345. The examiner can normally be reached 9:00 AM to 7:00 PM, Monday-Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rodney B. Bovernick can be reached on (571) 272-2344. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Any inquiry of a general or clerical nature should be directed to the Technology Center 2800 receptionist at telephone number (571) 272-1562.

*Michelle R. Connelly-Cushwa*  
Michelle R. Connelly-Cushwa  
Patent Examiner  
August 19, 2005